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WOMEN BUT NOT MEN EXHIBIT A POSITIVE CORRELATION BETWEEN COMPLEX PARTIAL EPILEPTIC-LIKE SIGNS AND TACTILE-VISUAL CROSS-MODAL MATCHING: IMPLICATIONS FOR HEMISPHERIC INTERCALATION [1]

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Summary.—16 right-handed men and 19 women were asked to feel various sized wooden cubes with the dominant hand for 2 sec. (without visual feedback) and then to select this cube from a random visual arrangement of cubes (tactile-visual matching) after a brief delay. The accuracy for men and women for this task did not differ significantly; however, the accuracy was significantly correlated (*rho* = 0.61) with a history of complex partial epileptic-like signs for the women but not for the men. The results support the hypothesis that elevated scores for complex partial epileptic-like signs in right-handed women enhance their capacity to associate different perceptual domains of the same stimuli because there is elevated activity within the (multimodal) hippocampal-amygdaloid system (sensory-limbic hyperconnectionism) and the correlative enhanced intercalation between the right and left temporoparietal lobes.

Whereas amygdalectomy disrupts delayed tactile-visual cross-modal matching in monkeys (Murray & Mishkin, 1985), facilitation of this capacity should occur if there is sensory-limbic hyperconnectionism (Bear, 1979). Sabourin and Persinger (1987) reported a weak but statistically significant negative correlation (– .36) between the numbers of cross-modal matching errors and the numbers of phenomenological symptoms from which one infers temporal lobe lability (Persinger & Makarec, 1993). These results were consistent with Bear's concept that enhanced lability within mesiobasal structures of the temporal lobes (where multimodal integration with affective dimensions occurs) should facilitate associations between sensory modalities.

The small magnitude of the correlation between a performance-based task and an inference of temporal lobe function (based upon subjective experiences) suggests that other moderating variables may be important. One candidate is the sex difference in some brain structure (Witelson, 1991). The robust, differential localization of magnetoencephalographic auditory-evoked fields for normal men and women supports the general concepts that (1) more coherence, or less lateralization, is displayed by the female brain than the male brain (Corsi-Cabrera, Herrera, & Malvido, 1989) and (2) one major area of the sexual dimorphism involves the parietotemporal lobes (Reite, Cullum, Stocker, Teale, & Kozora, 1993).

We hypothesized that these properties would encourage greater inter-

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hemispheric intercalation (Persinger, 1993) in the normal right-handed woman. Elevated baseline activity of the limbic structures within the temporal lobes should facilitate both activation and intercalation of these cortical regions. If this is valid, then women should exhibit a strong and significant correlation between complex partial epileptic-like signs and fewer cross-modal matching errors while men should not exhibit this pattern. However, as predicted by both Witelson's concept of sexual mosaicism (1991) and Annett's (1991) theory of human balanced polymorphism, the proficiency ("accuracy") of men and women should be quantitatively similar.

To test this hypothesis a total of 20 men and 20 women who were enrolled in first-year psychology courses were tested as subjects; they received a 2% bonus for participation. Only the data from subjects who preferred the right hand (defined by eating and writing) were analyzed (16 of the men; 19 of the women). There was no statistically significant difference between the ages of the two genders ($M = 25.0$ yr., $SD = 7.6$).

Each subject was tested singly. The subject first completed the *short* version of the Personal Philosophy Inventory that contains clusters which allow inference of complex partial epileptic-like signs (16 items) and control (yes responding) items. A modified version of the cross-modal matching procedure reported by Sabourin and Persinger (1987) was employed. Briefly, one of each type of five different-sized wooden cubes was placed in different orders on 20-cm by 50-cm plywood boards. A total of 20 trials was given to each subject. For each trial, the subject was instructed to place the preferred hand (palm up) through a cloth-covered device that was like a test-panel for tactile perceptions. One of the five sizes of cubes was placed in the subject's hand for 2 sec., the block was removed, and the subject was instructed to remove the hand and to wait either for 3 sec. (first 10 trials) or for 30 sec.; one of the five boards was then presented for 10 sec. only. The subject was instructed to point to (but not touch) the cube that had just been in the hand. The cube board was then removed from the subject's sight.

Because the numbers of errors between the first 10 trials ($M = 2.4$, $SD = 1.8$) and the second 10 trials ($M = 2.4$, $SD = 1.7$) did not differ significantly (correlated $t < 1.00$), the data were summed. There was no statistically significant difference ($F_{1,33} = 0.01$, $p > .05$) between the men and women for mean total errors. The mean and standard deviation were 4.9 and 2.8 and the range was 0 to 11; in comparison the Sabourin and Persinger (1987) mean was 4.5 (range 0 to 9). There were also no statistically significant sex differences from percentage of endorsed complex partial epileptic-like signs ($M = 27\%$ and $SD = 19\%$) and the control ($M = 79\%$ and $SD = 11\%$) items.

Spearman correlations between numbers of matching errors and complex partial epileptic-like signs were 0.31 ($p > .05$) and -0.61 ($p < .01$) for the men and women, respectively. Partial correlation analyses, after holding the

variance associated with the control (yes responding) cluster constant, showed partial r values between complex partial epileptic-like signs and matching errors of 0.31 for the men and -0.57 ($p<.01$) for the women. Scattergrams verified that the significant correlations were not due to outliers.

We suggest the following interpretation of the results. Right-handed women but not right-handed men who reported elevated complex partial epileptic-like signs were more accurate than men or women with less frequent signs on a volitional task (a traditional left-hemispheric process) that required approximating stereognostic data with visual equivalents differentially located in space (a traditional right-hemispheric process). Either greater limbic activity or more effective subcortical (hippocampal-amygdaloid)-cortical connections facilitated the intercalation (and hence the accuracy of choice) between the temporoparietal lobes of the two hemispheres.

Right-handed men displayed choice accuracies that were comparable to those of right-handed women; however, the scores for the men were not associated with their numbers of complex partial epileptic-like signs. The absence of this significant association suggests that these men employed an alternative processing strategy. These results also support the statement that men and women may be similar but for different reasons (Persinger, 1991). As suggested by peer review, we reanalyzed the Sabourin and Persinger (1987) data for each sex. The results were compatible with those of the present study; the correlation (*rho*) between the total numbers of errors and the cluster of complex partial epileptic-like signs was -0.37 ($p<.10$) for the 12 women and -0.16 ($p>.10$) for the 13 men.

REFERENCES

ANNETT, M. Speech lateralisation and phonological skill. *Cortex*, 1991, 27, 583-593.

BEAR, D. M. Temporal lobe epilepsy—a syndrome of sensory-limbic hyperconnectionism. *Cortex*, 1979, 15, 357-384.

CORSI-CABRERA, M., HERRERA, P., & MALVIDO, M. Correlation between EEG and cognitive abilities: sex differences. *International Journal of Neuroscience*, 1989, 45, 133-141.

MURRAY, E. A., & MISHKIN, M. Amygdalectomy impairs cross-modal matching in monkeys. *Science*, 1985, 228, 604-605.

PERSINGER, M. A. Canonical correlation of a temporal lobe signs scale with schizoid and hypomania scales in a normal population: men and women are similar but for different reasons. *Perceptual and Motor Skills*, 1991, 73, 615-618.

PERSINGER, M. A. Vectorial cerebral hemisphericity as differential sources for the sensed presence, mystical experiences and religious conversions. *Perceptual and Motor Skills*, 1993, 76, 915-930.

PERSINGER, M. A., & MAKAREC, K. Complex partial epileptic-like signs as a continuum from normal to epileptics: normative data and clinical populations. *Journal of Clinical Psychology*, 1993, 49, 33-45.

REITE, M., CULLUM, C. M., STOCKER, J., TEALE, P., & KOZORA, E. Neuropsychological test performance and MEG-based brain lateralization: sex differences. *Brain Research Bulletin*, 1993, 32, 325-328.

SABOURIN, L., & PERSINGER, M. A. Specific temporal-lobe signs and enhanced delayed cross-modal matching performance. *Perceptual and Motor Skills*, 1987, 64, 309-310.

WITELSON, S. F. Neural sexual mosaicism: sexual differentiation of the human temporoparietal region for functional asymmetry. *Psychoneuroendocrinology*, 1991, 16, 131-153.

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